J. New York Entomol. Soc. 105(3–4):154–160, 1997

A REVIEW OF THE GENUS *HELIOTHRIPS* (THYSANOPTERA; THRIPIDAE), WITH A NEW SISTER-SPECIES OF THE GREENHOUSE THRIPS FROM SOUTH EASTERN BRAZIL

Laurence A. Mound[1] and Renata C. Monteiro[2]

[1]CSIRO Entomology, PO Box 1700, Canberra, Australia; and
[2]Departamento de Entomologia, ESALQ, Piracicaba, Brasil, SP

Abstract.—*Heliothrips zucchi* is described as a new species from south eastern Brazil. It is very similar in structure to *H. haemorrhoidalis,* the greenhouse thrips. Because nearly all known males of *H. haemorroidalis* have been found in the western part of the Amazon basin, it is suggested that this is the area of origin of this worldwide pest. The only other member of the genus is from southern Africa, and a key is provided to distinguish the three species.

The Greenhouse Thrips, *Heliothrips haemorroidalis* (Bouché), is known as a pest on many different plants worldwide (Kudo, 1992; Wilson, 1975). However, males are never found in these pest populations. The female bias in such populations is reflected in the accumulated Thysanoptera collections at the natural history museums in London and Washington, D.C., which contain about 800 females of this species but only 21 males (Mound, 1976). Of these males 13 were from Brazil. Moreover, Mound and Marullo (1996) recorded one field sample from southern Peru in which 30% of the adults were males. Although thrips are haplo-diploid, arrhenotokous parthenogenesis is common amongst species that have been distributed widely by human activities, and the presence of males in a sample is considered sometimes to indicate the area of original distribution of a species. Therefore, the presence of males of *H. haemorrhoidalis* in Brazil, and particularly this relatively large number of males in a sample from Peru, is considered likely to indicate that this species is native to South America, in particular to the western side of the Amazon basin. *Heliothrips* previously included only one other species, *H. sylvanus* Faure from southern Africa, and this pair of species presumably reflects an ancient vicariance event related to the break-up of Gondwanaland.

The purpose of this paper is to describe a third member of the genus, structurally very similar to *H. haemorrhoidalis,* that has been found recently in south eastern Brazil at sites between Rio de Janeiro and São Paulo. The two South American species presumably represent a subsequent vicariance event, involving the eastern and western borders of the Amazon basin. A similar vicariance pattern within South America is found in other organisms, such as certain butterflies (see Brown, 1996, for references), and is possibly related to the extensive zone of lower rainfall that largely separates the forests bordering the Atlantic from those of western Brazil.

Two of the species in this genus are known to be highly polyphagous. However, they seem to be specific to plants with hard leaves and do not breed on herbs. Moreover, they are normally found breeding on older leaves and not on young apical leaves. This suggests that their host-plant acceptance behaviour is cued by factors

that are rather different from those used by the many species of thrips that show some level of specificity to particular plant taxa.

Genus *Heliothrips* Haliday

Heliothrips Haliday, 1836:43. Type-species *H. adonidum* Haliday, a junior synonym of *Thrips haemorrhoidalis* Bouché, by monotypy.

This genus is a member of the thripid sub-family Panchaetothripinae, known at one time as the Heliothripinae (Wilson, 1975). Within this sub-family it is related to a group of primarily tropical genera that includes *Australothrips* Bagnall and *Phibalothrips* Hood (Marullo and Mound, 1997). The members of these genera all have simple sense cones on the third and fourth antennal segments, and minute veinal setae on the forewings. However, these genera are currently placed in a tribe, Panchaetothripini, with several other taxa that seem to be considerably more distantly related (Kudo, 1992).

Generic definition. Color golden brown to dark brown; head, body and legs with extensive reticulate sculpture; head almost parallel-sided but sharply constricted at base, vertex concave near margins of compound eyes; setae minute. Antennae with 8 segments; segment VIII slender, at least 3 times as long as VII; sense cones on III and IV simple; no microtrichia on III or IV. Thoracic nota with extensive reticulate sculpture. Pronotum transverse, setae minute. Mesonotum divided only in posterior third. Metanotum with median triangle of sculpture bearing a marginal craspedum of variable length. Macropterous; first vein of forewing fused to costa; veinal setae minute; wing widened at base, apex rounded and bearing long cilia; posteromarginal cilia straight on distal half of wing but several cilia near cross vein wavy. Tarsi 1-segmented. Abdominal tergites II–VIII with extensive reticulate sculpture laterally, reticles also present in front of antecostal ridge; tergite VIII with posteromarginal comb of microtrichia; tergite X dorsally with complete longitudinal division. Sternites with 3 pairs of small marginal setae, all arising in front of margin. Males with stout setae dorsally on tergite IX; sternites with glandular area.

KEY TO SPECIES OF *HELIOTHRIPS* (FEMALES)

1. Tibiae and tarsi dark brown; forewing anterior margin without cilia; head relatively long, length/width ratio 0.9; tergites II–V with median pair of setae minute, less than 15 microns, and far apart; tergite VIII with teeth of posteromarginal comb broadly based, and with a few teeth absent medially; tergite IX without microtrichia dorsally near posterior margin; tergite X 0.7 times as long as tergite IX ..... *sylvanus*
– Tibiae and tarsi yellow, much paler than abdomen; forewing anterior margin with cilia present on distal half of wing; head shorter, length/width ratio 0.8 or less; tergites II–V with median pair of setae longer, 30 to 50 microns, and closer together than their length; tergite VIII with teeth of posteromarginal comb uniformly long and slender; tergite IX with many microtrichia dorsally near posterior margin; tergite X shorter, 0.5 to 0.6 times as long as IX 2
2. Femora as yellow as tibiae; antennal segment VI yellow at least in basal third, sometimes almost completely yellow; antennal segment IV at least 0.75 as long as III; ventral sense cone on antennal segment IV short and slender, 0.4–0.5 times as long as the segment ..... *haemorrhoidalis*
– Femora dark brown in contrast to yellow tibiae; antennal segment VI dark brown, or

slightly paler at base; antennal segment IV shorter, 0.65 as long as III; ventral sense cone on antennal segment IV longer and stouter, 0.75 as long as the segment . . . . *zucchi*

Heliothrips haemorrhoidalis (Bouché, 1833: 42)

Wilson (1975) recognised *H. haemorrhoidalis* var. *ceylonicus* Schmutz as a species distinct from *H. haemorrhoidalis* on the basis of the sculpture of the metanotum. Moreover, because of variation in the sternal glands of males, he considered that *H. haemorrhoidalis* in South America consisted of several cryptic species. Neither of these views was accepted by Mound (1976), who pointed out that the metanotal craspedum varies considerably between individuals, both within and between populations from different parts of the world. Mound also suggested that the extreme rarity of the production of males in *H. haemorrhoidalis* indicates that they are spanandric, that is that they are generally not involved in reproduction and that their variation is therefore not relevant to distinguishing species. Because 19 of the 21 known males of this species had been collected in neotropical countries, particularly Brazil, Mound (1976) predicted that a bisexual population of *H. haemorrhoidalis* might exist somewhere in the Neotropics. Subsequently, a sample was studied that had been taken from a population on a tree in southern Peru using an insecticide fogging technique, and this sample comprised 35 females and 15 males, this being the highest proportion of males to females for any sample of this species ever studied (Mound and Marullo, 1996). On the basis of the presence of these males, *H. haemorrhoidalis* is considered likely to be native to the western side of the Amazon basin.

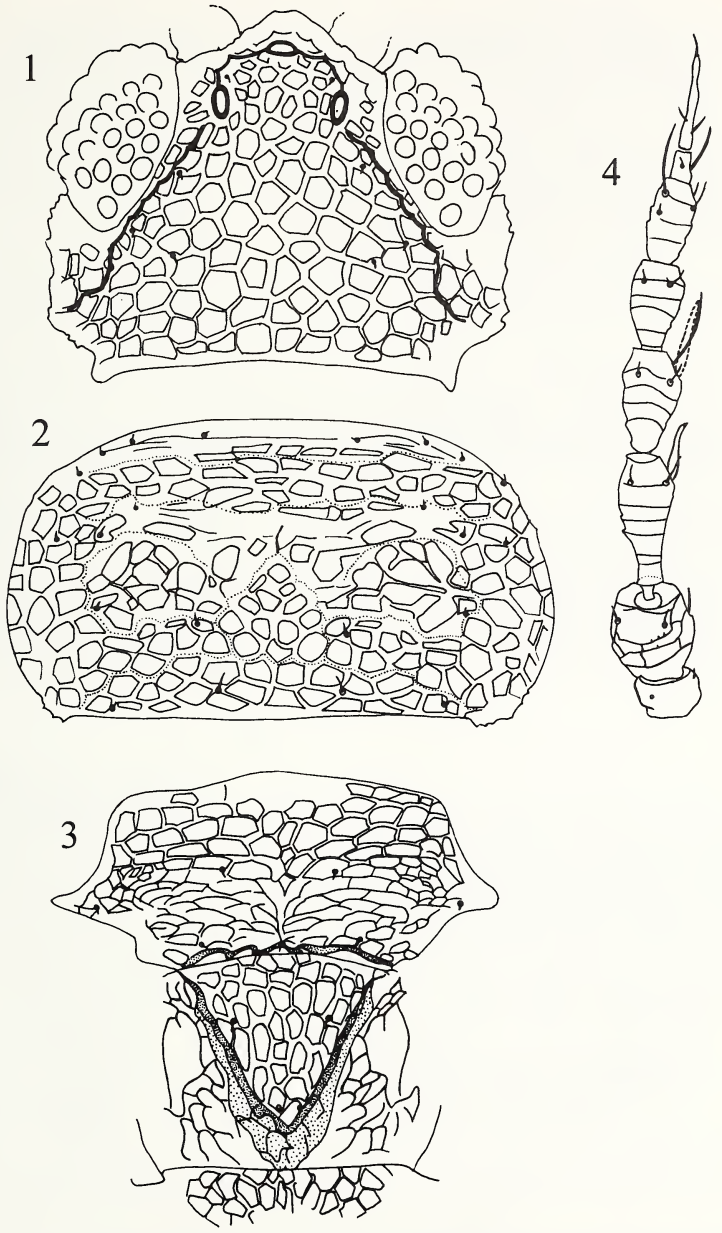
The females of this species are variable in size and color. Each female takes several days to achieve full mature coloration, and so specimens with the abdomen yellow are collected commonly. The variation in size is equally surprising, because not only are the antennae longer in larger individuals, but the slender dorsal sense cone on antennal segment IV is much longer in large individuals. In the largest females studied, this slender dorsal sense cone extends from segment IV almost to the mid-point of antennal segment VI.

Heliothrips sylvanus Faure, 1933: 1

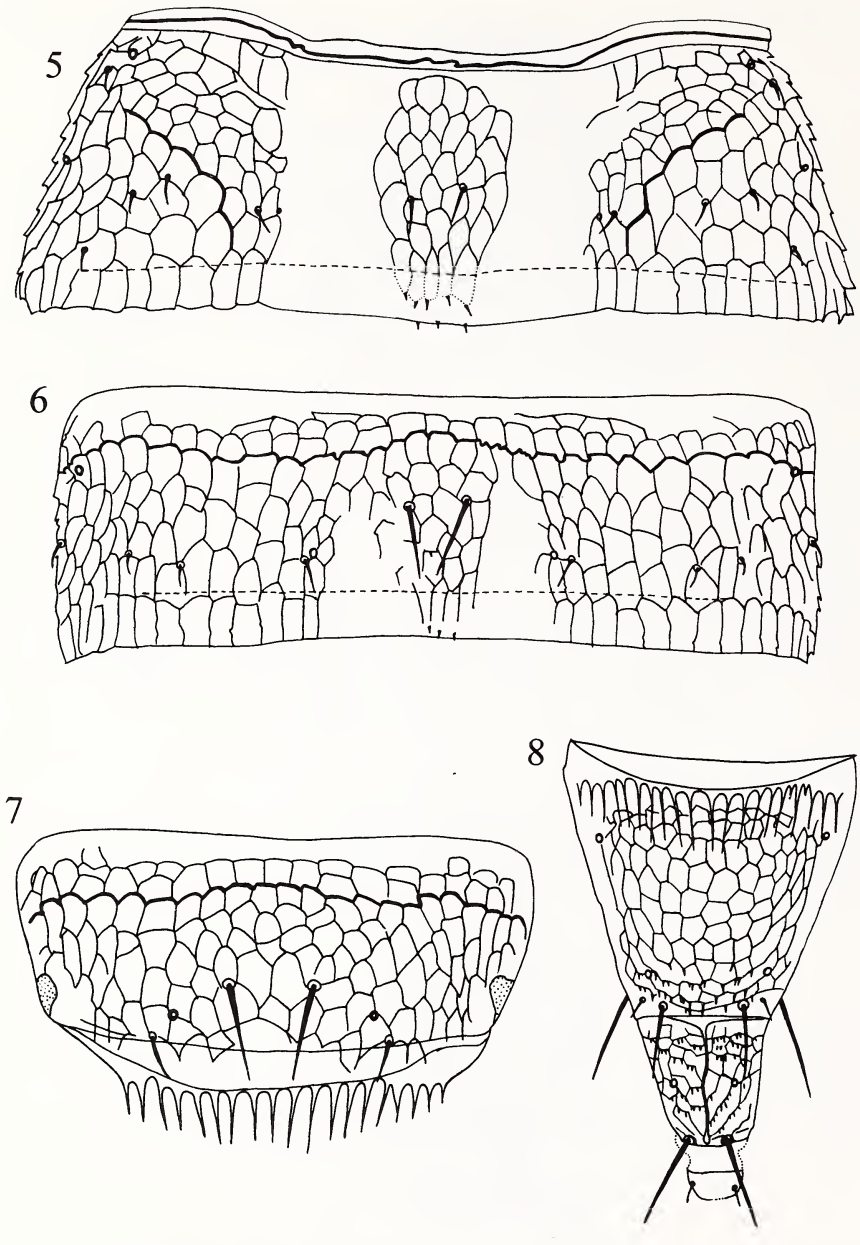
As indicated in the generic definition, this species from southern Africa shares many characters with the two South American species. However, the longer head, short median tergal setae, and lack of cilia on the forewing anterior margin, all suggest a relationship to *Phibalothrips* species. Abdominal tergite I has a pair of specialised reticulate areas laterally that extend antero-dorsally; these areas seem to represent a plastron associated with the spiracles.

Heliothrips zucchi, new species

Female macroptera: Color of head, body and femora dark brown, abdominal segments VIII–X golden yellow, tibiae and tarsi yellow; forewing yellow but shaded along veins and at base, wing scale brown; antennal segments I–II light brown, III–V yellow, VI mainly dark brown with base variably paler, VII–VIII light brown; major setae yellowish brown. Abdomen paler in younger individuals.



Figs. 1–4. *Heliothrips zucchi,* 1. Head. 2. Pronotum. 3. Meso- and metanotum. 4. Antenna.



Figs. 5–8. *Heliothrips zucchi*, 5. Abdominal tergite II. 6. Abdominal tergite V. 7 Abdominal tergite VIII. 8. Abdominal tergites IX and X.

Head typical of genus with cheeks slightly concave (Fig. 1). *Antennae* (Fig. 4) with segment IV bearing 2 sense cones, the dorsal slender cone much shorter than in *haemorrhoidalis,* and the ventral cone longer and stouter. Pro-, meso-, and metanota (Figs. 2 and 3), also legs and wings, typical of genus. *Abdomen* with tergites very similar to *haemorrhoidalis* (Figs. 5–8).

Measurements (holotype female in microns): Body length 1,400. Head, length 140; width 180. Pronotum, length 120; width 210. Forewing, length 670; distal width 40. Tergite V median setae length 30. Tergite VIII median setae length 50. Tergite IX length 120. Tergite X length 60. Antennal segments III–VIII length 60, 38, 32, 27, 10, 35; sense cone on III length 25, ventral sense cone on IV length 28.

Material studied: Holotype female: Brazil, State of São Paulo, Campinas, Santa Genebra Reserve, from leaves of ?Meliaceae, 2.vii.1996 (LAM and RCM), in Museo do Departamento de Entomologia, ESALQ. Paratypes: 2 females collected with holotype; State of São Paulo, Piracicaba, ESALQ Campus, 2 females from leaves of shrubs, 13.iii.1997 (LAM, 3133), in ESALQ and BMNH, London; State of Rio de Janeiro, Rio de Janeiro, Jacarepagua, 3 females from dead branches, 9.v.1948 (J. D. Hood and T. Borgmeier), in USNM, Washington.

Comments: This new species is closely related to *H. haemorrhoidalis.* Both species differ from *H. sylvanus* in having the head and tergite X shorter, but the median tergal setae longer, and in possessing cilia on the anterior margin of the forewing. The clearest discriminating character states for the two South American species, apart from the striking difference in color of the femora, are the shorter antennal segment IV and its longer ventral sense cone in *H. zucchi* in comparison to *H. haemorrhoidalis.*

ACKNOWLEDGMENTS

The new species is dedicated to Prof. Roberto A. Zucchi, University of São Paulo at ESALQ, Piracicaba, in gratitude for his promotion of, and active support for, the collaborative project on the thrips of southern Brazil of which this paper is a part. We are particularly grateful to FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) for the financial support that has made this project possible. Dr. Sueo Nakahara of the USDA, Beltsville, Maryland, recognised specimens of the new species in the USNM collections and kindly sent them on loan together with valuable comments on their structure.

LITERATURE CITED

Bouché, P. Fr. 1833. Naturgeschichte der schädlichen und nützlichen Garten-Insekten und die bewähtesten Mittel zur Vertilgung der Ersteren. Berlin. 176 pp.

Brown Jr., K. S. 1996. Diversity of Brazilian Lepidoptera: history of study, methods for measurement, and use as indicator for genetic, specific and system richness. Chapter 15, pages 221–253, *in:* Bicudo, de M. C. E. and N. A. Menezes (eds). Biodiversity in Brazil. A first appraisal. Instituto de Botanica/CNPg, São Paulo.

Faure, J. C. 1933. New genera and species of Thysanoptera from South Africa. Bull. Brooklyn Entomol. Soc. 28:1–17.

Haliday, A. H. 1836. An epitome of the British genera, in the order Thysanoptera, with indications of a few of the species. Entomol. Mag. 3:439–451.

Kudo, I. 1992. Panchaetothripinae in Japan (Thysanoptera, Thripidae). 1. Panchaetothripini, the genera other than *Helionothrips.* Jpn. J. Entomol. 60:109–125.

Marullo, R. and Mound, L. A. 1997. A second species of the genus *Australothrips* (Thysanoptera). J. Austr. Entomol. 36:221–224.

Mound, L. A. 1976. The identity of the greenhouse thrips *Heliothrips haemorrhoidalis* (Bouché) (Thysanoptera) and the taxonomic significance of spanandric males. Bull. Entomol. Res. 66:179–180.

Mound, L. A. and Marullo, R. 1996. The Thrips of Central and South America: an introduction. Mem. Entomol. Intl. 6:1–488.

Wilson, T. H. 1975. A monograph of the subfamily Panchaetothripinae (Thysanoptera: Thripidae). Mem. Am. Entomol. Inst. 23:1–354.

Received 5 August 1997; accepted 20 November 1997.